INVESTIGATOR'S ANNUAL REPORT

National Park Service

All or some of the information provided may be available to the public

Reporting Year: 2002	**Park:** Shenandoah NP
Principal Investigator: Dr David DeSante	**Office Phone:** 415-663-2052 **Email:** ddesante@birdpop.org
Address: The Institute for Bird Populations, P.O. Box 1346 Point Reyes Station, CA 94956-1346 US	**Office Fax:** 415-663-9482

Additional investigators or key field assistants (first name, last name, office phone, office email):

Name: Ron Melcer	**Phone:** n/a	**Email:** n/a
Name: Danika Tsao	**Phone:** n/a	**Email:** n/a
Name: Caitlin Kight	**Phone:** n/a	**Email:** n/a

Permit#:
SHEN-2002-SCI-0006

Park-assigned Study Id. #:
SHEN-00150

Project Title:
BIRD MONITORING: MONITORING AVIAN PRODUCTIVITY AND SURVIVORSHIP (MAPS) IN SHENANDOAH NATIONAL PARK (Study number N-150)

Permit Start Date: May 01, 2002	**Permit Expiration Date** Apr 30, 2003
Study Start Date: May 01, 2002	**Study End Date** Apr 30, 2003

Study Status:
Continuing

Activity Type:
Monitoring

Subject/Discipline:
Birds / Ornithology

Objectives:

We have been operating this study in Shenandoah National Park for the past 10 years (since 1992). The study involves constant-effort mist netting and banding of landbirds. The objectives are: (1) to provide, for 19 target landbird species, annual indices of adult population size and post-fledging productivity from capture data on adult and young birds, and annual estimates of adult survival rates from mark-recapture data on adult birds; (2) to identify temporal and spatial patterns in those demographic indices and estimates, and to describe relationships between those patterns and (a) ecological characteristics and population trends of the target species, (b) station-specific and landscape-level habitat characteristics, and (c) spatially explicit weather data; and (3) to use this information to identify causes of population change in landbirds, formulate management strategies to reverse declines, and evaluate the effectiveness of any implemented management actions.

The abundant and diverse bird life in Shenandoah National Park is one of its most important natural resources and one that greatly enhances the quality of the visitor experience. Populations of some landbird species, however, are declining in the Park. It is important to understand the causes of these declines in order to implement management actions to reverse them. The Park provides critical control data from study areas in undisturbed landscapes that can be compared to data from study areas in managed landscapes in order to help determine how current land-management practices affect avian demographics. The overall trend in bird populations at Shenandoah National Park over the past ten years, as indicated by the MAPS Program, has tended to be positive. Substantial and significant increases have been recorded for six species whereas substantial and significant decreases were recorded for only two species (Gray Catbird and Chestnut-sided Warbler). We suggest that both the increases and decreases of these species at Shenandoah can be attributed to anomalously low or high populations that were present in the beginning of the study period and that were caused by sparse canopies and high densities of understory vegetation that resulted from the gypsy-moth canopy defoliation that culminated in 1993. That the population dynamics are now fairly consistent across species (except for those at Pinnacle Cliff as related to the fire of 2000; see below) may indicate

that the habitat is beginning to stabilize, ten years after the culmination of that dramatic event.

Findings and Status:

As in previous years, the capture rate of adult birds (the index of adult population size) was higher at stations dominated by northern red oak and at higher elevations than at stations dominated by chestnut oak or at lower elevation stations. In addition, stations dominated by northern red oak have tended to show higher productivity indices than all other stations. A fire in November 2000 reduced the cover of mountain laurel, the dominant shrub at Pinnacle Cliff, by approximately 80%. Breeding populations of all species pooled declined between 2001 and 2002 to a greater degree at the Pinnacle Cliff station than at any of the other stations, while productivity increased between 2001 and 2002 at the Pinnacle Cliff station by a greater degree than at any other station. Examination of individual species shows that the populations of several open-country or burn specialist species showed dramatic increases at Pinnacle Cliff between 2001 and 2002 whereas forest-dwelling species showed continued declines between 2001 and 2002. The increase in young captured and productivity at Pinnacle Cliff appear more difficult to explain. It will be very interesting to see how the composition of breeding species at this station changes over the next few years as the understory and canopy recover from what has historically been a naturally occurring event.

In contrast to population trends, productivity trends showed declines in 13 of 19 species, with substantial and significant or near-significant declines noted for four species (Wood Thrush, Gray Catbird, American Redstart, and Ovenbird). At present we have no explanation for this declining tendency in productivity at Shenandoah but we will be interested in continuing to monitor it as it may eventually start impacting the breeding population sizes of the park. As noted above, productivity in 2002 may have been abnormally low due to the dry weather conditions and this may be influencing these overall trends. With ten years of data, survival estimates could be obtained for 17 species in 2002, up from 14 in 2001. With more years of data we will be able to more accurately estimate temporal effects on survival probabilities, although it is likely that up to twenty years of data will be necessary to determine actual temporal trends in survivorship.

We have initiated two types of broad-scale analyses of MAPS data from other areas to help understand the population dynamics of landbirds and identify potential management actions to reverse population declines. First, by modeling spatial variation in vital rates as a function of spatial variation in population trends we are able to identify the proximate demographic causes of population decline within a species at multiple spatial scales. Second, we have found that patterns of landscape structure detected within a two- to four-kilometer radius area of each station are good predictors not only of the numbers of birds of each species captured but, more importantly, their productivity levels as well. These analyses provide powerful tools to aid in formulating landscape-level management actions aimed at reversing landbird population declines and maintaining stable or increasing populations of target species. If appropriate funding can be secured, we hope to be able to undertake such analyses using data from Shenandoah National Park and the surrounding region when 12 years of data have been obtained, that is, after the 2004 field season.

For this study, were one or more specimens collected and removed from the park but not destroyed during analyses?

No

Funding provided this reporting year by NPS:	**Funding provided this reporting year by other sources:**
20726	0

Fill out the following ONLY IF the National Park Service supported this project in this reporting year by providing money to a university or college

Full name of college or university:	**Annual funding provided by NPS to university or college this reporting year:**
n/a	0